

PATENT SPECIFICATION

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(54) DISPENSERS FOR USE IN BACTERIOLOGY AND SIMILAR BIO-CHEMICAL ANALYSIS

(71) We, UNILEVER LIMITED, a Company organised under the laws of Great Britain, of Unilever House, Blackfriars, London E.C.4., England do hereby declare the invention for which we pray that a patent may be granted to us and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention relates to dispensers for use in bacteriology and similar bio-chemical analysis.

In preparing Petri dishes for incubation, large numbers of bottles have to be filled with a given quantity of diluent, say 90ml, and these are then used in preparing sequential dilutions of samples.

The present invention provides a device which enables diluent and similar liquids to be conveniently and accurately dispensed from a single large stock.

Accordingly the invention provides a device for dispensing a liquid for bacteriological sampling, comprising a reservoir for liquid and a controlled volume dispenser connected to said reservoir via a conduit for liquid, means for applying pressure to the liquid in said reservoir to force liquid from said reservoir via said conduit and into said dispenser, control means for controlling the level to which said dispenser is filled from said reservoir to provide a controlled quantity of liquid in said dispenser, and dispensing control means for controlling dispensation of said controlled quantity of liquid from the dispenser, the reservoir and dispenser being detachable for separate sterilisation.

Since the reservoir, generally a large bottle, and dispenser are detachable the equipment is particularly suitable for bacteriological work because sterilisation after use is particularly convenient. In particular it is not necessary to sterilise mechanical and electrical parts necessary for pumping or controlling the system. Moreover a number of bottles and dispensers may be used at different times

with one driving and controlling mechanism. Different bottle and dispenser sets may contain different diluents, and one such set may be being sterilised in an autoclave while another is being used.

The control for filling and emptying the dispenser is in the form of externally applied clamps which flatten a flexible pipe coupling, to avoid internal contamination.

An embodiment of the invention will be described by way of example with reference to the diagrammatic drawings accompanying the Provisional Specification in which:

Figure 1 shows a side elevation of a dispensing device; and

Figure 2 shows a side elevation of a controlled volume dispenser.

Referring to Figure 1 a base housing 1 contains an enclosed area for electronic and electrical components and a stand for a reservoir bottle 2. The reservoir bottle should be of a material which can be sterilised in an autoclave.

In the lid of the bottle, two conduits are accommodated, the first, 3, leading to a metered dispenser which is shown in greater detail in Figure 2. This conduit 3 terminates within the bottom of the bottle as a dip tube. The second conduit 4 provides connection from the top of the bottle 2 via a bacterial filter 6 and a connecting union 5 to a small air pump 11. This pump provides positive pressure (it may be for example of the vibrating diaphragm type used in aquaria) to force air into the bottle and thus to force liquid up the dip tube and out of the bottle into the metered dispenser.

The metered dispenser has a body 9 which is connected via detachable clips 14 to the side of the base housing 1. It also has a dispensing outlet 10 at its lower end in the form of a flexible outlet pipe. This pipe has a shut-off valve 8 in the form of a wedge operated by a solenoid to press the flexible tubing flat against a back-up member to cut off the flow of liquid. The valve 8 constitutes the dispensing control means.

The conduit 3 is connected to the upper end of the dispenser and may be shut off by a similar solenoid operated wedge valve 7 (shown in Figure 1 but not in Figure 2). Detachable electrical connector 13 provides an electrical connection between an amplifier unit 12, which operates the solenoid valve 7 and level sensing elements within the dispenser.

The dispenser body 9 can be completely removed from the base housing 1 by unclipping at the clips 14 when the valves 7 and 8 are both in the open position, and by unplugging the connection 13. The reservoir 2 can be disconnected from the unit by disengagement of the connecting union 5 and then dispenser and reservoir and associated connecting conduit can be completely removed from the system for autoclaving.

Referring now to Figure 2 the dispenser unit body 9 is an autoclavable material, suitably a plastics or a non-corroding metal. At its lower end is the dispensing outlet tube 10 previously described and at its upper end the conduit 3 feeds into a dip tube 15 which has its outlet near the base of the interior of the body 9. The upper end of body 9 is closed off by a cap 22 having holes to accommodate the dip tube 15, a breather tube 21 and electrical wires 18. The breather tube includes a bacterial filter which allows air to escape and enter the dispenser according to the rise and fall of liquid within the body 9. The wires 18 lead to liquid level sensing electrodes 16 and 17 the upper of these 16 terminating at an upper liquid level point and the lower of these 17 terminating at a second liquid level point near the lower end of the interior of the body 9. A third electrode may be constituted by the body 9 (if of electrically conducting material) or by the dip tube 15 (if of electrically conducting material) or by a separately provided electrode and this should be such that contact is made with liquid at whatever level it may be within the body 9.

In operation and with pressure applied via pump 11, liquid is forced from the reservoir 2 up the dip tube and through the conduit 3 into the dip tube 15 of the body 9.

Liquid rises until an electrically conducting path is made with the electrode 16.

At this point an electrical signal is fed via the amplifier 12 to the shut-off valve 7 to shut off flow of liquid into the body 9. This provides a measured quantity of liquid at a level 19 within the body 9.

With the metered dispenser correctly filled, a press button release (not shown), releases the wedge valve 8 to enable liquid to be dispensed from the dispensing tube 10. In practice the unit will be placed with the dispensing tube just over the edge of a bench and a bottle or dish will be placed under the tube 10 to receive the measured quantity of liquid. Interlocks are incorporated to ensure that valve 8 cannot be opened for dispensing until valve 7 is closed.

A further feature of the device is that the second electrode 17 can be used, with appropriate switching, in place of the electrode 16 for dispensing a different and smaller quantity of liquid. The lower part of the dispenser body casing is of reduced internal diameter to improve the accuracy of metering of such small volumes, as determined by this lower electrode 17.

WHAT WE CLAIM IS:—

1. A device for dispensing a liquid for bacteriological sampling comprising a reservoir for liquid and a controlled volume dispenser connected to said reservoir via a conduit for liquid, means for applying pressure to the liquid in said reservoir to force liquid from said reservoir via said conduit and into said dispenser, control means for controlling the level to which said dispenser is filled from said reservoir to provide a controlled quantity of liquid in said dispenser, and dispensing control means for controlling dispensation of said controlled quantity of liquid from the dispenser, the reservoir and dispenser being detachable for separate sterilisation; and said control means and said dispensing control means are in the form of externally applied clamps which flatten a flexible pipe coupling, thereby avoiding internal contamination.

2. A device substantially as herein described with reference to the drawings accompanying the provisional specification.

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Sheet 1

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PROVISIONAL SPECIFICATION

2 SHEETS

This drawing is a reproduction of
the Original on a reduced scale

Sheet 2

FIG. 2.

